

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: GANDEL; Pierre

SERIAL NO.: 10/505,246

ART UNIT: 2834

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EXAMINER: Preston, E.D.

TITLE: LINEAR ACTUATOR COMPRISING A BRUSHLESS POLYPHASE ELECTRIC
MOTOR

Amendment A: REMARKS

Upon entry of the present amendments, previous Claims 1 - 13 have been canceled and new Claims 14 - 24 substituted therefor. Reconsideration of the rejections, in light of the forgoing amendments and present remarks, is respectfully requested. The present amendments have been entered for the purpose of distinguishing the present invention from the prior art.

In the Office Action, it was indicated that Claims 1, 2, 5, 6, 8, 11 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Hewette patent in view of the Huber patent in view of the Kobayashi patent. Additionally, Claims 3 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Hewette patent in view of the Huber patent in view of the Kobayashi patent and further in view of the Sieber patent. Claim 7 was rejected under 35 § U.S.C. 103(a) as being unpatentable over the Hewette patent in view of the Huber patent in view of the Kobayashi patent and further in view of the Corbett patent. Claim 9 was rejected under 35 § U.S.C. 103(a) as being unpatentable over the Hewette patent in view of the Huber patent in view of the Kobayashi patent and further in view of the Lamb patent. Claim 10 was “objected to” as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Additionally, the drawings were objected

to under 37 C.F.R. 1.83(a) as lacking the elements of Claim 13. Claim 1 was objected to because of various informalities.

As an overview to the present reply, Applicant has extensively amended the original claim language in the form of new Claims 14 - 24. New independent Claim 14 incorporates the limitations of previous independent Claim 1, along with the limitations of dependent Claim 5. In all of the new Claims 14 - 24, the limitations have been expressed in a more proper U.S. format, including proper antecedent bases and proper structural interrelationships throughout. Any indefinite terminology found in the original claim language has been corrected herein. In particular, where functional recitations are included in the claims, proper "means-plus-function" terminology has been included therein.

In particular, in independent Claim 14, it is now recited that the control organ "has a retracted position and an extended position relative to the electric motor". It is additionally indicated that the driving means is "reversible". It has been further indicated that the restoring means acts "at least partially on the control organ so as to restore the control organ via the driving means" into the retracted position. Applicant respectfully contends that these features serve to distinguish the present invention from the prior art combination.

In particular, in the prior art, it is important to note that the prior art actuators did not operate so as to have a "reversible" drive so as to return to a retracted position in the event of a power failure. This was recited in paragraph [0007] of the original specification as follows:

The problem raised by this kind of linear actuator with a multiphase motor consisted in that, in the event of failure of the motor, even if due to an interruption of power supply, the control organ and, hence, the part, for example the valve on which it acts, remains in the position reached before the failure occurs. Therefore,

since it does not return into a safety position, this can result into a more serious dysfunction at the level of the unit in which this controlled part fits.

As such, the present invention is a linear electric actuator for use with a brushless multiphase motor that overcomes the disadvantages of the prior art. This was recited in paragraph [0014] of the original specification as follows:

Therefore, within the framework of an inventive step it has been devised to associate with such a linear electric actuator with a brushless multiphase motor:

springy and/or magnetic restoring means allowing to systematically restore into a reference position the control organ on which has to act the rotor in the event of an interruption of power supply to the motor; and

a position-detection device contributing, in combination with an electronic control unit, to the control or adjustment of the position of the rotor, hence of the control organ.

In relation to these goals, it is important to note that none of the prior art patents cited by the Examiner offers a solution using a screw-and-nut system with a reversible movement. It is important to note that in the prior art, the prior art fails to achieve a return to the retracted position of the control organ by the application of a force to the output system. In the present invention, there is a reverse output which allows the actuator to come back to its initial position. In all of the prior art documents, the reversibility of the system is indispensably linked to the use of an elastic member (such as a spring) acting on the rotor. Paragraphs [0064] to [0071] of the present application describes that a certain reverse output is sought in order to enable the rotor to return to its retracted position under the action of a linear force coming from the organ controlled. This concept under the present invention allows the realization of a restoring means in the form of a compression spring at the shaft output and not, as in the prior art, in the form of spiral torsion spring acting at the input.

Such spiral torsion springs are difficult to pre-stress when fitted. In any case, it is only possible to pre-stress them over a few turns. This limits the force and/or the travel of the motor. Therefore, the travel is possible only over a very limited number of turns. In other words, the spiral spring limits the travel of the actuators.

The Sieber patent refers to a system of the spring which exerts its action on the moving part in a very different way than that of the present invention. The linear spring does not act directly on the driving means (namely the screw-and-nut system) but on the rotor plus screw/nut assembly in order to move it. On this basis, Applicant contends that the limitations introduced in independent Claim 14, by combining previous independent Claim 1 with the limitations of dependent Claim 5, effectively distinguishes the present invention from the prior art.

Dependent Claims 15 - 17 correspond, respectively, to the limitations found in previous dependent Claims 2 - 4. Dependent Claims 18 - 24 correspond, respectively, to the limitations found in previous dependent Claims 6 - 12. In view of the Examiner's objections, Applicant has deleted dependent Claim 13 since the limitations of dependent Claim 13 were not clearly shown in the drawings.

Based upon the foregoing analysis, Applicant contends that independent Claim 14 is now in proper condition for allowance. Additionally, those claims which are dependent upon Claim 14 should also be in condition for allowance. Reconsideration of the rejections and allowance of the claims at an early date is earnestly solicited. Since no new claims have been added above those originally paid for, no additional fee is required.

Respectfully submitted,

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